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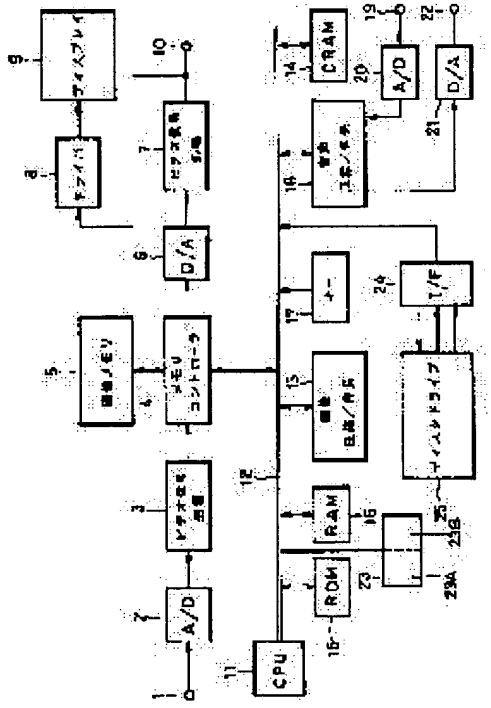
(54) DISK DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To verify whether data writing is correctly performed while preventing a writing time from being extended and to restore a disk having broken down TOC(Table Of Contents) information or data management file.

SOLUTION: A verification memory 23 controlled by a CPU 11 is provided. After power ON, or only at the time of first writing after disk loading, TOC information or disk management information is stored in a memory 23A, and data is transferred to a DRAM 14 and then written y a disk drive 25 in an area different from the normal writing area of a magneto-optical disk. The written data is reproduced, stored in' the DRAM 14 and then stored in a memory 23B. Detection is made as to coincidence in contents between the memories 23A and 23B and, if non-coincidence is detected, an alarm display is made by a display 9.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the disk unit applied when recording digital data on a magneto-optic disk.
[0002]
[Description of the Prior Art] As one of the magneto-optic disks, the magneto-optic disk with a diameter of 64mm contained by the cartridge is proposed. This magneto-optic disk is known as MD for audios (mini disc). Digital data other than audio data are recordable to this magneto-optic disk. Such a disk is MD. It is called DATA and the specification is standardized. Furthermore, MD Picture MD is standardized as that into which DATA was developed. It is possible to record the digital signal which the video signal for example, based on an image pck-up signal was digitized in Picture MD, for example, was compressed into it by the picture compression of a JPEG (Joint Photographic Experts Group) method. A JPEG method compresses still picture data with DCT (Discrete Cosine Transform) and a variable length sign, and can compress color still picture data into 1 / 8 - 1/100 by the JPEG method. If the still picture data compressed into the same magneto-optic disk as MD by the JPEG method are recorded, the still picture data of about 300 sheets are recordable with the disk of one sheet.
[0003] Usually, in disk units, such as a floppy disk, it can be set as one side of ON or OFF, a user chooses one of whether data are verified or it does not carry out, and the check (verification is called) of the written-in data performs write-in operation. In this case, in Verification OFF, it will be noticed that began when using the data with which it could not guarantee that data were written in correctly, but time wrote it in earnestly when write-in operation became unstable, and the right writing was not carried out. In Verification ON, in order to check by reading the data which wrote data in the degree of predetermined unit ******, rotational delay arises and writing takes time.
[0004] In the recorder which uses MD mentioned above, it is the record unit called a cluster and is made as [reproduce / record / / data]. In the case of MD, since the amount of data of audio data is compressed into about 4.5 times, unlike CD, record/reproduction of data are made intermittently. One cluster consists of 36 sectors, 1 sector is converted into time, and is 13.3ms, and the time of one cluster is 478.8ms (about 0.5 seconds). When verifying, after writing in one cluster, this one cluster is reproduced and it is made as [collate / reproduction data and record data]. Consequently, if it verifies, it is with writing and read-out, and the disk trace time of double precision is needed, and the access time for re-reading of the written-in data is also required.
[0005] As one rotation does not correspond with the composition unit of data like a CAV (constant angular velocity) disk since it is a CLV (constant linear velocity) disk, but time is taken in order to access the original position as compared with a CAV disk, and ** was also mentioned above, the trace time of double precision is required for MD. Therefore, by MD recorder, in order that the time at the time of writing may avoid a bird clapper for a long time, verification of data is not performed.
[0006] Furthermore, by MD recorder, when a shock is added at the time of record/reproduction, in order to prevent a sound jump, it has memory. If a shock is added, pickup will be returned to the original position at high speed, and it will write in and be made to carry out the data accumulated at memory. The idle time produced by the data compression is used as a margin for the sound jump prevention at the time of writing, and when idle time decreases, the effect of sound jump prevention will decrease. Verification is carried out also from this point, twist, and there was nothing.
[0007]
[Problem(s) to be Solved by the Invention] As mentioned above, data are not verified by MD recorder. Therefore, neither degradation of the laser output of writing nor the dirt of a disk shows that the writing of data has become unstable. Moreover, restoration of a disk was difficult when the data control file for managing the data recorded on the disk broke.
[0008] Therefore, the purpose of this invention is in a disk unit like MD recorder to offer the disk unit which can be verified, time preventing a bird clapper for a long time at the time of the writing of data.

[0009] Moreover, other purposes of this invention are to offer the disk unit which enables restoration of the disk with which the data control file broke.
[0010]
[Means for Solving the Problem] In order to attain the purpose mentioned above, this invention In the disk unit which records data to a disk-like record medium The pickup means for writing in data to a disk-like record medium and reading data in a disk-like record medium, A record processing means to generate the data which write-in data are supplied and are supplied to a pickup means, A regeneration means by which the data read by the pickup means are supplied, Only in the time of the 1st and 2nd memory, the first writing, or the first read-out The TOC information or data control file read from the disk-like record medium is stored in the 1st memory. The 1st TOC information or data control file from memory is written in area other than the usual write-in area of a disk-like record medium. It is the disk unit characterized by having a means to verify by reading written-in the TOC information or data control file in area other than the usual write-in area, storing in the 2nd memory, and comparing the content of the 1st and 2nd memory. Moreover, when the content of the 1st and 2nd memory is inharmonious, it is made as [generate / the warning which tells that writing is unstable].
[0011] The TOC information or data control file read into the 1st memory from the disk-like record medium at the time of the first writing or the first read-out is stored, and this data is written in area other than the usual write-in area of a disk-like record medium. It reproduces from a disk-like record medium and the written-in data are read into the 2nd memory. The content of such the 1st and 2nd memory is compared. Writing is made unstable to both being inharmonious. Moreover, since these last data can be read when TOC information or a data control file breaks, restoration of a disk is possible.
[0012]
[Embodiments of the Invention] Hereafter, one example of this invention is explained with reference to a drawing. This one example compresses a digital still picture video signal by the JPEG method, and records it on the same magneto-optic disk as MD (mini disc). In drawing 1 , the video signal (still picture video signal) from the sources, such as an electronic still camera, a scanner, a video camera, and television broadcasting, is supplied to the video input terminal shown by 1. An electronic album can be created by incorporating a picture with a scanner. Moreover, the audio input terminal 19 which the audio signals (narration relevant to a still picture, BGM, etc.) relevant to this video signal mention later is supplied.
[0013] An input video signal is supplied to A/D converter 2. A still picture video signal is digitized by A/D converter 2. As an example, it is sampled by the tetragonal lattice and the digital image (standard picture) of (640 pixel x480 line) is generated. The output of A/D converter 2 is supplied to the video signal processing circuit 3. Of the video signal processing circuit 3, the component video signal which consists of a luminance signal Y and color-difference-signal R-Y, and B-Y is formed. A component video signal is a method (4:2:0). Moreover, in the video signal processing circuit 3, signal processing, such as a gamma correction, an aperture correction, and shading processing, is performed.
[0014] The video signal from the video signal processing circuit 3 is incorporated by the image memory (VRAM) 5 under control of a memory controller 4. And the video signal incorporated by this image memory 5 is supplied to the bottom of control of a memory controller 4 at D/A converter 6. A digital video signal is changed into an analog video signal by D/A converter 6.
[0015] The output of D/A converter 6 is supplied to the video signal processing circuit 7. The output of the video signal processing circuit 7 is supplied to a display 9 through the display driver 8. A liquid crystal display, a CRT monitor, etc. can be used as a display 9. It is the video signal processing circuit 7, for example, the composite video signal of an NTSC color TV system is formed, and this composite video signal is outputted from the video signal output terminal 10.
[0016] Moreover, the digital video signal incorporated by the image memory 5 is supplied to picture compression / extension circuit 13 through the CPU bus 12. Picture compression / extension circuit 13 is compression / thing to elongate for example, using a JPEG method about a digital video signal (still picture signal). A JPEG method is carrying out DCT conversion and carrying out variable length coding of the digital video signal, and compresses a digital video signal.

[0017] The video signal from an image memory 5 is compressed by the JPEG method by picture compression / extension circuit 13. The compressed video signal is once stored in DRAM14 through the CPU bus 12. And if the preservation instruction from CPU11 occurs, the data from DRAM14 will be supplied to a disk drive 25 through an interface 24, and will be recorded on a magneto-optic disk. About a disk drive 25, it mentions later.
[0018] CPU11 is performing record/regeneration of the whole system, such as processing for compressing the inputted video signal and recording on a magneto-optic disk, and processing for elongating the signal reproduced from the magneto-optic disk, and making it reproduce. The CPU bus 12 is drawn from this CPU11. A memory controller 4, the picture compression / extension circuit 13, DRAM14, ROM15 and RAM16, a key 17, the speech compression / extension circuit 18, an interface 19, and memory 23 are connected to the CPU bus 12.
[0019] A power supply key, an ejection key, a reproduction key, the halt key, the stop key, the song selection key, the recording key, etc. are contained in the key 17. Moreover, hour entries, such as the total reproduction time of not only a still picture but a disk, elapsed time of the program under reproduction, the remaining reproduction time of the program under reproduction, and the whole remaining reproduction time, the track number of the program under reproduction, etc. are displayed on a display 9. Furthermore, a display 9 expresses these information as the disk on which the disk name and the truck name are recorded. Furthermore, if it is the disk with which record time is recorded, record time will be displayed on a display 9.
[0020] BGM reproduction which performs narration reproduction it is heard that explanation is in relation to a picture by recording more nearly further the file management data which manage a video data and voice data into a disk, and prolonged music reproduction is attained. Furthermore, the video data which can compound character data and pattern data and by which this character data and pattern data were compounded is recordable to a video data.
[0021] The analog audio signal from an input terminal 19 is changed into a digital signal by A/D converter 20, and is supplied to speech compression / extension circuit 18. Moreover, the audio signal from speech compression / extension circuit 18 is taken out by the output terminal 22 as an analog audio signal by D/A converter 21. The same compression coding (called ATRAC) as MD is used for speech compression / extension circuit 18.
[0022] Memory 23 consists of the 1st memory 23A and the 2nd memory 23B. This memory 23 is formed in order to verify at the time of writing so that it may mention later. Memory 23 may be constituted using a part of DRAM14 or RAM16, and may be prepared with another CPU in a disk drive 25.
[0023] An example of a disk drive 25 is shown in drawing 2 . In drawing 2 , 31 is a magneto-optic disk, and a diameter is 64mm like MD and it is contained in the cartridge 32. Wearing of a magneto-optic disk 31 opens the shutter prepared in the cartridge. A magneto-optic disk 31 rotates by the spindle motor 33. The magnetic head 34 for record counters and is arranged at the upper part of this magneto-optic disk 31, and an optical pickup 35 counters the lower part, and it is arranged. Movement to radial [of a disk] of an optical pickup 35 and the magnetic head 34 is enabled by the delivery motor 36.
[0024] The servo control circuit 37 is controlling the delivery motor 36 while it controls the biaxial device of an optical pickup 35 and performs a focus and tracking control based on the focal error signal and tracking error signal which were generated in the RF circuit 38. Moreover, a spindle motor 33 is controlled by the servo control circuit 37.
[0025] The compression video data incorporated from DRAM14 through the interface 24 is encoded with an encoder 39 at the time of record. An encoder 39 performs processing of EFM (8 -14 modulation) and CIRC (Cross Interleave Reed Solomon Code). That is, by CIRC, error correction coding is processed and coded data is modulated by the method of EFM. The output of an encoder 39 is supplied to the magnetic head 34 through the head drive circuit 40. And while the laser beam from an optical pickup 35 is irradiated by the magneto-optic disk 31, the modulation magnetic field from the magnetic head 34 is impressed to a magnetic disk 31. Thereby, record data are recorded by the optical MAG method.

[0026] In addition, the video signal stored in the image memory 5 at the time of record is supplied to D/A converter 6. The output of D/A converter 6 is supplied to the video signal processing circuit 7. The output of the video signal processing circuit 7 is supplied to a display 9 through the display driver 8. Thereby, the screen currently recorded on the display 9 is displayed.
[0027] Moreover, record of data is intermittently performed per cluster like MD. One cluster is 36 sector and 1 sectors (it is equivalent to 1 sub-code block of a compact disk) are 5.5 sound groups. 32 sector serves as effective data among actual 1 cluster. The 4 remaining sectors are used as linking area, in order to double timing to the standup of the magnetic field of the magnetic head at the time of a recording start, and control of a laser power.
[0028] The amount of data in which the record in 1 sector is possible is 2KB (kilobyte), and the amount of data in which the record in 1 cluster is possible is 64KB. The standard digital still picture (standard picture) of (640x480) is compressed by JPEG, and let it be the amount of data of 64KB or 128KB. In the time of compressing into 64KB, one cluster and the still picture of one sheet correspond. In the time of compressing into 128KB, the still picture of one sheet is recorded as two clusters. Consequently, the still picture of a maximum of 2000 sheets is recordable to the magneto-optic disk of one sheet. However, in the mode in which a still picture and music are intermingled, it is supposed that a standard picture is able to record 365 sheets or 730 sheets, and music in a stereo for 40 minutes.
[0029] Moreover, the position on the disk at the time of record is specified to be the groove prepared along the truck of a magneto-optic disk 31 by the address by which wobble record is carried out. This address is detected by the address decoder 41 connected to RF amplifier 38. The address detected by the address decoder 41 is supplied to a decoder 42. The address information generated in the decoder 42 is transmitted to CPU11 through an interface 24 and the CPU bus 12.
[0030] In addition, write-in data are stored in DRAM14 at once. DRAM14 has the data capacity (this example 1 M bits) of one or more clusters. Like MD, by the case where the audio signal is compressed, the time concerning reading data into DRAM14 to the limit is 0.9 seconds, and this data is equivalent to the audio data for about 3 seconds. That is, even if it becomes impossible to write data in the right address, after writing in DRAM14, storing data, writing in the right address and a position's returning, it is controlled by the shock from the outside etc. to write in from DRAM14 and to output data. Moreover, when a shock is added, after record operation is stopped immediately and accessing the right address by the midst which is writing in data, write-in operation is made again.
[0031] When it reads to DRAM14 and data are stored to the limit at the time of reproduction, even if it becomes impossible to read the signal of a disk 31 by the shock from the outside etc., it is possible to continue outputting a regenerative signal for about 3 seconds in the case of audio data. An optical pickup is re-accessed between them in the original position, and generating of a sound jump can be prevented by performing signal reading again.
[0032] The area of pattern data and the area of character data other than the area of luminance-signal data and chroma signal data are prepared for the image memory 5. Pattern data and character data are assigned to the area of this pattern data, and the area of character data. This pattern data and character data are compounded by luminance-signal data and chroma signal data using a micro program. Thus, the video data by which pattern data and character data were compounded can record the video data by which this pattern data and character data were compounded on a magneto-optic disk 31 while being displayed on a display 9.
[0033] Next, operation at the time of still picture reproduction is explained. At the time of still picture reproduction, the picture to reproduce is specified by the key 17. An optical pickup 35 is moved to the address on which the specified picture is recorded, and the compression video signal of the picture specified by the optical pickup 35 is reproduced from a magneto-optic disk 31. This regenerative signal is supplied to a decoder 42 through RF amplifier 38. Processing of the recovery of EFM, an error correction, etc. is performed by the decoder 42.
[0034] The output of a decoder 42 is once stored in DRAM14 through an interface 24 and the CPU bus 12. And the data from DRAM14 are supplied to picture compression / extension circuit 13. The still picture video signal compressed by the JPEG method is elongated in picture compression / extension

circuit 13. That is, the decode of JPEG is made. The elongated still picture video signal is stored in the bottom of control of a memory controller 4 by the image memory 5.
[0035] The video signal stored in the image memory 5 is supplied to D/A converter 6. The output of D/A converter 6 is supplied to the video signal processing circuit 7. The output of the video signal processing circuit 7 is supplied to a display 9 through the display driver 8. A reproduction still picture is displayed on a display 9. Moreover, it is the video signal processing circuit 7, for example, the composite video signal of an NTSC color TV system is formed, and this composite video signal is outputted from the analog video signal output terminal 10.
[0036] When recording audio data, the compressed audio data are once stored in DRAM14. And this audio data is supplied to the encoder 39 of Magnetic-Optical disk drive 25 through an interface 24. Processing of coding of an error correction, the modulation of EFM, etc. is carried out by the encoder 39, and the audio signal compressed into the magneto-optic disk 31 is recorded.
[0037] When reproducing audio data, the audio data compressed from the magneto-optic disk 31 are reproduced. This reproduction data is supplied to a decoder 42 through RF amplifier 38, and the output of a decoder 42 is transmitted on the CPU bus 12 through an interface 24. This compressed audio data is once stored in DRAM14. And this compressed audio signal is supplied to speech compression / extension circuit 18 from DRAM14. An audio signal is elongated in speech compression / extension circuit 18. This audio signal is supplied to D/A converter 21. The output of D/A converter 21 is outputted from an output terminal 22.
[0038] As a magneto-optic disk 31, there are three kinds of things, the disk only for reproduction, a recordable magneto-optic disk, and the hybrid disk with which the field only for reproduction and a recordable field are intermingled. Drawing 3 shows the format of the magneto-optic disk 31 which can apply this invention, and drawing 4 shows the format of hybrid disk 31' which can apply this invention.
[0039] It is equipped with the clamping plate 41 with which the information film was put on the polycarbonate substrate, and a magneto-optic disk 31 consists of the magnetic substance in the center. The record film of the information films has the structure where the laminating of a dielectric layer, MO layer, a dielectric layer, a reflective film, and the protective coat was carried out to order from the substrate side. The layer only of the information films and for reproduction consists of a reflective film and a protective coat. Let the field of record film other than clamping plate 41 of a disk 31 be the information area 42.
[0040] Let the most-inner-circumference side of the information area 42 be the lead-in groove area 43. The film only for reproduction is put on the lead-in groove area 43, and information is beforehand recorded on it with the form of a pit. The recorder bull area 44 exists in the periphery side of the lead-in groove area 43, and the lead-out area 45 exists in the outermost periphery. Record film is put on the recorder bull area 44 and the lead-out area 45. The UTOC area 46 is arranged at the inner circumference side of the recorder bull area 44, and a program area 47 is arranged at the periphery side.
[0041] The calibration area 48 exists in the most inner circumference of a between [the lead-in groove area 43 and the UTOC area 46 (i.e., recorder bull area)]. Moreover, the gap area 49 exists between the UTOC area 46 and a program area 47. User data is not recorded on these calibration area 48 and the gap area 49. The calibration area 48 is formed for adjustment of the laser output at the time of record.
[0042] It is the same as that of a magneto-optic disk 31 that the most-inner-circumference side of the information area 42 is made into the lead-in groove area 43, and the lead-out area 45 exists in the outermost periphery in the case of hybrid disk 31' shown in drawing 4 . The 1st program area 51 exists in the periphery side of the lead-in groove area 43. The film only for reproduction is put on the lead-in groove area 43 and the 1st program area 51, and information is beforehand recorded on them with the gestalt of a pit. The recorder bull area 52 exists in the periphery side of the lead-in groove area 43. The UTOC area 53 is arranged at the inner circumference side of the recorder bull area 52, and the 2nd program area 54 is arranged at the periphery side.
[0043] In hybrid disk 31', the calibration area 48 exists in between the 1st program area 51 and the UTOC area 53 (i.e., the most inner circumference of the recorder bull area 52). Moreover, the gap area 49 exists between the UTOC area 53 and the 2nd program area 54.

[0044] P-TOC (pulley mustard TOC (Table Of Contentes)) is beforehand recorded on the lead-in groove area 43 of the most inner circumference of a magneto-optic disk 31. The truck name which are the start address of each music of the disk, the end address, and the name of music, the disk name which is the name of a disk are written to P-TOC so that it may explain in detail later. Furthermore, in order to manage the recorded signal, U-TOC (user TOC) is recorded on the U-TOC area 46 of a magneto-optic disk 31. About U-TOC, the format of the 0 sector sector 1 and sector 2 grade is specified like the after-mentioned.
[0045] In case record/reproduction operation is performed to a magneto-optic disk 31, it is necessary to read the management information (namely, P-TOC, U-TOC) currently recorded on the magneto-optic disk 31. CPU11 will distinguish the address of the area which should record on a magneto-optic disk 31 according to such management information, and the address of area which should be reproduced. This management information is once held at DRAM14, and some data needed are transmitted to CPU11 after that. When a magneto-optic disk 31 is loaded with such management information, it is read, and CPU11 stores it in DRAM14, and enables it to refer to it henceforth in the case of record/reproduction operation to the magneto-optic disk 31. In addition, MD In the magneto-optic disk (MD picture) which recorded DATA or still picture information, file management data are recorded on user data record area, and, in addition to TOC, this file management data is also read at the time of disk wearing.
[0046] Moreover, U-TOC is edited according to record and elimination of data, and is rewritten. CPU11 performs this edit processing at every record/elimination operation to the U-TOC information in which it was stored by DRAM14. And it is made to rewrite the U-TOC area of a magneto-optic disk 31 to predetermined timing. For example, when ejection operation of a magneto-optic disk 31 was made, or when operation of power supply OFF is made, it is made to rewrite U-TOC on a magneto-optic disk 31.
[0047] Here, the data sector recorded with a sector data gestalt in a magneto-optic disk 31 and the P-TOC sector which manages record/reproduction operation of data, and a U-TOC sector are explained. A P-TOC sector is explained first.
[0048] As P-TOC information, area specification of the recordable area (recorder bull user area) of a disk etc., management of U-TOC area, etc. are performed. in addition, the case where it is the pulley mustard disk whose magneto-optic disk 31 is an optical disk only for reproduction -- P-TOC -- ROM -- it is made as [perform / management of the music currently-izing / music / and recorded]
[0049] Drawing 5 shows one sector (sector 0) of the P-TOC information repeatedly recorded in the lead-in groove area 43 made into P-TOC. In addition, although a P-TOC sector exists to a sector 0 - a sector 4, it is made into the option after the sector 1. A P-TOC sector consists of (4 byte x588=2352 byte), and let 4 bytes of a head be a header. In a header, it is oar '0'. Or oar '1' The address which indicates the cluster address and a sector address to be the synchronous patterns which consist of 1-byte data is included.
[0050] Moreover, the discernment ID by the ASCII code corresponding to the character "MINI" is added to the predetermined address position following a header, and it is shown that it is the field of P-TOC. furthermore -- continuing -- the start address PCA of the tune number (Fitst TNO) of a disk type, a recording level, and the first musical piece currently recorded, the tune number (Last TNO) of the last musical piece, the start dress LOA of the lead-out area 45, a sector operating condition (User sectors), and the calibration area 48, the start address USTA of the U-TOC area 46, and start address RSTA of the program area 47 which can be recorded etc. -- it is recorded
[0051] Then, the correspondence table directions data division which have the table pointer (P-TNO1 - P-TNO255) to which the parts table in the managed table section which mentions later each musical piece currently recorded with the pit form is made to correspond are prepared. and -- the field following correspondence table directions data division -- a table pointer (P-TNO1 - P-TNO255) -- corresponding - (01h) (FFh) up to -- the managed table section in which 255 parts tables were prepared is prepared In addition, the numeric value which attached "h" in this specification expresses the so-called thing of the hexadecimal notation.
[0052] It is made as [record / the start address which serves as an origin about a certain parts, the end address used as termination, and the mode information on the parts (truck mode) / on each parts table].

The classification of a monophonic recording/stereo etc. is recorded [whether the mode information on the truck in each parts table is the information and audio information on whether the parts are set as for example, the ban on over-writing, or the ban on a data copy, and].
[0053] it can set in the managed table section (01h) - (FFh) up to -- as for each parts table, the contents of the parts are shown by the table pointer (P-TNO1 - P-TNO255) That is, about the musical piece of the 1st musical piece, a certain parts table (for example (01h)) is recorded as table pointer P-TNO1, and it is a parts table (01h) in this case. A start address turns into a start address of the record position of the musical piece of the 1st musical piece, and the address turns into the end address of the position where the musical piece of the 1st musical piece was recorded similarly. Furthermore, truck mode information turns into information about the 1st musical piece eye.
[0054] Similarly, about the 2nd musical piece, the start address, the address, and the truck mode information of a record position on the 2nd musical piece are recorded on the parts table (for example (02h)) shown in table pointer P-TNO2. Since the table pointer is prepared to P-TNO255 like the following, on P-TOC, management is made possible to the 255th music. And a predetermined musical piece can be accessed and it can be made to reproduce by forming the P-TOC sector 0 in this way for example, at the time of reproduction.
[0055] In addition, since the so-called musical piece area of pulley mustard does not exist in the case of MD (magneto-optic disk) in which record/reproduction is possible, the correspondence table directions data division and the managed table section which were mentioned above are not used, therefore the whole of each byte is set to "00h." Management of the recorded data is managed by U-TOC explained below. However, about disk 31' of the hybrid type mentioned above, the above-mentioned correspondence table directions data division and the managed table section are used for management of the musical piece in the ROM area (the 1st program area 51).
[0056] Next, explanation about the sector 0 and sector 1 of U-TOC is performed as U-TOC. In addition, the 2 sector sector 4 is described briefly later. Moreover, the 3 sector sectors 5-7 are undefined. the musical piece which drawing 6 shows the format of the U-TOC sector 0, and the user mainly recorded here -- the management information about a free area which can record a musical piece is newly recorded
[0057] For example, in case it is going to record a certain musical piece to a magneto-optic disk 31, CPU11 will discover the free area on a disk from the U-TOC sector 0, and will record audio data here. Moreover, the area where the musical piece which should be reproduced is recorded at the time of reproduction is distinguished from the U-TOC sector 0, the area is accessed, and reproduction operation is performed.
[0058] Like P-TOC, first, a header is prepared, and data, such as a maker code, a model code, a tune number (First TNO) of the first musical piece, a tune number (Last TNO) of the last musical piece, a sector operating condition (Used sectors), a disk serial number, and Disk ID, are continuously recorded on the predetermined address position by the U-TOC sector 0 shown in drawing 6 . Furthermore, when a user makes it correspond to the managed table section which mentions later a field, a free area, etc. of the musical piece currently recorded and recorded, in order to discriminate, the field where various kinds of table pointers (P-DFA, P-EMPTY, P-FRA, P-TNO1 - P-TNO255) are recorded as correspondence table directions data division is prepared.
[0059] And 255 parts tables to - (FFh) are prepared as the managed table section to which a table pointer (P-DFA - P-TNO255) is made to correspond (01h), and the start address which serves as an origin about a certain parts like the P-TOC sector 0 of drawing 5 , the end address used as termination, and the mode information on the parts (truck mode) are recorded on each parts table. Furthermore, since in the case of this U-TOC sector 0 the parts shown on each parts table continue to other parts and may be connected with them, it enables it to record the link information which shows the parts table on which the start address and the end address of the parts connected are recorded.
[0060] In this kind of record regenerative apparatus, since it is convenient in reproduction operation by reproducing accessing between parts even if it records the data of one musical piece over two or more parts discontinuously physically, about the musical piece which a user records, it may divide and record

on two or more parts from the purposes, such as efficiency use of the area which can be recorded. Therefore, number (01h) - which the link information was prepared, for example, was given to each parts table (FFh) It is made as [connect / a parts table] by specifying the parts table which should be connected.
[0061] In addition, a link information is shown in fact by the numeric value made the byte position in the U-TOC sector 0 by predetermined data processing. That is, a parts table is specified as 304+(link information) x8 (byte eye).
[0062] In addition, since parts division is not usually carried out about the musical piece recorded with a pit form in a pulley mustard disk etc., as shown in drawing 5 , all link informations are made into "(00h)" in the P-TOC sector 0.
[0063] That is, in the managed table section in the U-TOC sector 0, one parts table is expressing one parts, for example, management of the parts position is made on three parts tables connected by the link information about the musical piece which three parts are connected and is constituted.
[0064] The contents of the parts are shown as follows by the table pointer [in / correspondence table directions data division / in each parts table to - (FFh) in the managed table section of the U-TOC sector 0 (01h)] (P-DFA, P-EMPTY, P-FRA, P-TNO1 - P-TNO255).
[0065] Table pointer P-DFA The defective field on a magneto-optic disk 31 is shown, and the parts table of the head in one parts table in which the truck portion (= parts) used as the defective field by the blemish etc. was shown, or two or more parts tables is specified. That is, when defective parts exist, it is table pointer P-DFA. It sets, it is recorded any of - (01h) (FFh) they are, and defective parts are shown to the parts table equivalent to it by a start and the end address. Moreover, when defective parts exist in others, other parts tables are specified as a link information in the parts table, and defective parts are shown also in the parts table. And when there are no defective parts of further others, a link information is made into "(00h)", and is henceforth made to have no link.
[0066] table pointer P-EMPTY the case where 1 in the managed table section or the parts table of the head of two or more intact parts tables is shown, and an intact parts table exists -- table pointer P-EMPTY ****** -- it is recorded any of - (01h) (FFh) they are When two or more intact parts tables exist, it is table pointer P-EMPTY. The parts table is specified one by one by the link information from the specified parts table, and all intact parts tables are connected on the managed table section.
[0067] Table pointer P-FRA The free area (the eliminated field is included) which can write in the data on a magneto-optic disk 31 is shown, and the parts table of the head in 1 the truck portion (= parts) used as a free area was indicated to be, or two or more parts tables is specified. That is, when a free area exists, it is table pointer P-FRA. It sets, it is recorded any of - (01h) (FFh) they are, and the parts which are free areas are shown to the parts table equivalent to it by a start and the end address. Moreover, when there are two or more such parts, that is, there are two or more parts tables, even the parts table on which a link information becomes "(00h)" is specified one by one by the link information.
[0068] By the way, if it is the magneto-optic disk which record of audio data, such as a musical piece, is not made at all, and a defect does not have, either, it is table pointer P-FRA. A parts table (01h) is specified and it is shown by this that the whole recorder bull user area of a disk is a free area. and table pointer P-EMPTY described above since the parts table of - (FFh) which remains in this case (02h) would be used a parts table (02h) is specified and a parts table (03h) specifies as a link information of a parts table (02h) -- having -- ****** -- even a parts table (FFh) is connected like The link information of a parts table (FFh) is made into in this case, " (00h) which shows those without connection henceforth."
[0069] In addition, at this time, about a parts table (01h), as a start address, the start address of recorder bull user area will be recorded, and the address in front of a lead-out start address will be recorded as the end address.
[0070] Table pointer P-TNO1 - P-TNO255 specify the parts table in which the musical piece by which the user recorded on the magneto-optic disk 31 is shown, for example, the parts of 1 or two or more parts with which the data of the 1st music were recorded in table pointer P-TNO1 which serve as a head in time were shown.
[0071] For example, when the musical piece made into the 1st music is recorded by one parts, without

[that is,] dividing a truck on a disk, the record section of the 1st music is recorded as the start in the parts table shown by table pointer P-TNO1, and the end address.
[0072] Moreover, when the musical piece made into the 2nd music, for example is dispersedly recorded on two or more parts in a disk top, in order to show the record position of the musical piece, each parts are specified according to time sequence. That is, even the parts table on which other parts tables are further specified one by one by the link information according to time sequence, and a link information becomes "(00h)" from the parts table specified to be table pointer P-TNO2 is connected. In case the time of reproduction of the 2nd music and over-writing to the field of the 2nd music are performed using the data of this U-TOC sector 0 by specifying all the parts with which the data which constitute the 2nd music in this way were recorded one by one, and recording them, the position of an optical pickup 35 and the magnetic head 34 is controlled, continuous music information is taken out from dispersed parts, or the record which carried out efficiency use of the record area is attained.
[0073] Next, the U-TOC sector 1 is explained. Drawing 7 shows the format of the U-TOC sector 1. When a music name is attached to the musical piece to which the user mainly recorded or it attaches a disk title, let the U-TOC sector 1 be the data area which records the inputted alphabetic information.
[0074] Slot pointer P-TNA1 - P-TNA255 are prepared for this U-TOC sector 1 as character slot directions data division equivalent to each recorded musical piece. Moreover, the character slot section specified by this slot pointer P-TNA1 - P-TNA255 is prepared. Slot (01h) - (FFh) of 255 units is formed in the character slot section in 8 bytes of one unit, and an alphabetic data is managed with the almost same form as the U-TOC sector 0 mentioned above.
[0075] The alphabetic information as a disk title (disk name) or a music name (truck name) is recorded on slot (01h) - (FFh) by the ASCII code. In addition, let the slot used as 8 bytes in front of a slot (01h) be the exclusive area of a disk name.
[0076] And the character which the user inputted corresponding to the 1st music will be recorded on the slot specified by slot pointer P-TNA1, for example. For example, if the pointer which P-TNA1 shows becomes two, the truck name of the 1st music is contained in the head in x(76+2x2) 4 bytes of one sector. P-TNA2 or subsequent ones is the same. Moreover, by a slot being linked by the link information, even if the character input corresponding to one musical piece (truck) becomes larger than 7 bytes (seven characters), it can respond. In addition, at this U-TOC sector 1, it is slot pointer P-EMPTY. The slot which is not used is managed. That is, table pointer P-EMPTY of the U-TOC sector 0 mentioned above The intact slot is managed like the management method of the intact parts table to twist.
[0077] The data area which records the recording time of the musical piece to which the user mainly recorded as a U-TOC sector 2 besides the above 0 sector U-TOC sector 1 is prepared. Drawing 8 shows the data composition of the U-TOC sector 2. By MD recorder made possible [using the U-TOC sector 2], it is automatically [the time of record] recordable simultaneously with record. P-TRD1 is written to the start address on the sector 2 containing the time on which the 1st music was recorded. That is, if the pointer which P-TRD1 shows is 3, the recording time of the 1st music is written to the head in x (76+3x2) 4 bytes of two sector. P-TRD2 or subsequent ones is the same.
[0078] Moreover, as a U-TOC sector 4, like a sector 1, when a music name is attached to the musical piece to which the user recorded or it attaches a disk title, the data area which records the inputted alphabetic information is prepared. The data composition of this sector 4 is the same as that of the U-TOC sector 1 almost. However, the code data corresponding to the kanji or the Europe character in this sector are recorded, and, in addition to the data of the U-TOC sector 1, the attribute of the character code used for the predetermined byte position as character code is recorded. Management of the alphabetic information of this U-TOC sector 4 is performed by slot (01h) - (FFh) of 255 units specified by slot pointer P-TNA1 - P-TNA255 and slot pointer P-TNA1 - P-TNA255 as character slot directions data division like a sector 1.
[0079] Drawing 9 shows processing in case a drive reads the P-TOC sector and U-TOC sector which were mentioned above. If having been opted for and equipped with whether it was equipped with the magneto-optic disk 31 at Step S1 is detected, the lead-in groove area 43 will be reproduced first, and P-

TOC currently recorded there will be stored in DRAM14 through an interface 24 from a disk drive 25. Furthermore, CPU11 reads the required information in P-TOC from DRAM14 into RAM16.
[0080] Based on the hole where CPU11 is formed in the cartridge, the disk with which it was equipped determines whether to be a magneto-optic disk (Step S3). The flag which shows whether it is a magneto-optic disk is prepared, and this flag is set in the case where it is a magneto-optic disk. Reading processing of TOC is completed in the case where that is not right. In the case of a magneto-optic disk, in step S4, the U-TOC area 46 is reproduced and reproduced U-TOC is stored in DRAM14 through an interface 24 from a disk drive 25. Furthermore, CPU11 reads the required information in U-TOC from DRAM14 into RAM16.
[0081] CPU11 determines MD for data, and MD for music from the alphabetic information currently recorded into P-TOC. For example, if it is MD for music, the character of MINI is written and the character of MINX is written in the case where it is MD for data. The flag which shows whether it is MD for data is prepared, and this flag is set when the disk with which it was equipped is MD for data. Unlike MD for music, in addition in the case of MD for data, the data control file is recorded for U-TOC mentioned above on the program area. The record position of this data control file is written as information on U-TOC, therefore accesses the record position of a data control file in the following step S6, and reads this data control file into DRAM14.
[0082] In the one example of this invention, writing is made to perform verification which confirms whether to be the corrected no. CPU11 controls verification operation according to the flow chart shown in drawing 10 . First, the check of being the first writing is made in Step S11. Verification is made at the time of the first writing. The first writing means the writing made by the beginning after power supply ON or disk wearing. In addition, unlike this one example, you may be made to verify at the time of read-out of the beginning after disk wearing. That is, at the time of disk wearing, as mentioned above, read-out of TOC information or a management file is made. TOC information or a management file is used at the time of this read-out, and it may be made to perform verification same with stating below.
[0083] Verification processing will not be made if the result of the check of Step S11 is negative. In Step S11, if being the first writing is determined, processing will move to Step S12. At this step S12, it is determined with reference to the flag with which it is stored in RAM16 of CPU11 whether it is MD for data (MD DATA). If that is right, in Step S13, a data control file will be read into memory 23A from RAM16. This data control file is directory information currently recorded on MD for data, or Picture MD, is read at the time of disk wearing, and is stored in RAM16 of CPU11. In Step S13, U-TOC is read into memory 23A from RAM16 of CPU11 in Step S14 by the case where it is not MD for data.
[0084] In the following step S15, the contents (namely, a data control file or U-TOC) of memory 23A are transmitted to DRAM14. In Step S16, the laser output at the time of record is lowered. A laser output is lowered for expecting safety. For example, the right writing is not made, as a result of lowering a laser output, when the laser output was falling to performing normal record to the grade near a limitation. Therefore, it is detectable that the laser output is carrying out the remarkable fall. CPU11 controls the optical pickup 35 in a disk drive 25 through the servo control circuit 37, and a laser output is adjusted.
[0085] The predetermined data stored in DRAM14 are supplied to a disk drive 25 through an interface 24, and are recorded on area other than the usual write-in area of a magneto-optic disk 31 (Step S17). More specifically, writing is made to the calibration area 48 or the blank area 49.
[0086] Immediately after writing, the written-in data are reproduced by the disk drive 25, and it writes in DRAM14 through an interface 24 (Step S18). In Step S19, the reproduction data stored in DRAM14 are transmitted to memory 23B. It is confirmed whether CPU11 compares the contents (written-in data) of memory 23A with the contents (read data) of memory 23B, and both corresponds (Step S20). If both are in agreement, the result of verification will be made good and processing will be completed.
[0087] In Step S20, when both are not in agreement, in Step S21, the alarm display of write-in abnormalities is made and processing is completed. If at least 1 bit of data is different, it will be detected as inharmonious. However, the inharmonious number of bits is counted, and when there are more inharmonious numbers than a predetermined value, you may make it treat with an inequality. Warning

of write-in abnormalities is made the content which warns of a possibility that writing may not be made normally being high by the fall of a laser output etc. like "there is a write-in error" and "writing not being made."
[0088] In addition, warning may be the sound of not a display but a buzzer etc. Moreover, although it is made to verify by one writing in the one example mentioned above, a laser output is not lowered but it may be made to perform two writing, for a laser output to be lowered, to warn of the 1st write-in abnormality, and to warn in the 2nd writing in the 1st writing, of the 2nd write-in abnormality. In this case, you may be made to warn, as long as it is abnormal, without performing warning in the stage of the 1st writing, when the 2nd rewrite is performed. The area on the disk with which the 1st writing is made, and the area on the disk with which the 2nd writing is made do not need to be still the same, and you may differ.
[0089]
[Effect of the Invention] According to this invention, at the time of record of a magneto-optic disk, before writing in an effective data, it can know beforehand that normal writing is impossible with degradation of laser, the dirt of a disk, etc., and it can prevent writing in the effective data which becomes invalid. If abnormalities are not specifically probably repaired even if it exchanges disks, and investigates the influence of the dirt of a disk etc. and exchanges disks when warning of write-in abnormalities has come to be carried out, the fault of sets, such as degradation of a laser output, can be judged. In this invention, since it verifies at the time of the first writing or the first read-out, as compared with always verifying at the time of writing, the time which write-in operation takes can prevent a bird clapper for a long time.
[0090] moreover -- after writing a data control file in calibration area and performing this normally at the time of the first writing, until the usual data writing is performed and renewal of an original data control file is performed -- write-in abnormalities -- **** -- a case -- a disk -- reading -- it cannot do -- becoming -- things -- **** . However, in this invention, since TOC information or file management data is written in the calibration area or blank area which is not usually used, it becomes restorable [a disk] by using a data control file just before having written in calibration area or blank area. Restoration of a disk can read the data control file currently written to calibration area or blank area, and can be performed by writing in the area of an original data control file.

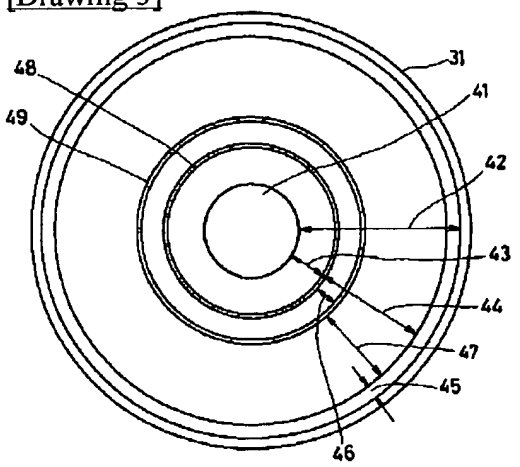
[Translation done.]

CLAIMS

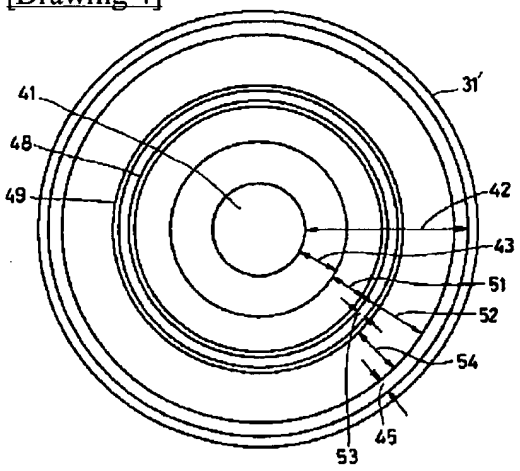
[Claim(s)]
[Claim 1] The disk unit which is characterized by providing the following and which records data to a disk-like record medium The pickup means for writing in data to a disk-like record medium and reading data in the above-mentioned disk-like record medium A record processing means to generate the data which write-in data are supplied and are supplied to the above-mentioned pickup means A regeneration means by which the data read by the above-mentioned pickup means are supplied Only in the time of the 1st and 2nd memory, the first writing, or the first read-out The TOC information or data control file read from the disk-like record medium is stored in the 1st memory of the above. The 1st above-mentioned TOC information or data control file from the above-mentioned memory It writes in area other than the usual write-in area of the above-mentioned disk-like record medium. A means to verify by reading written-in the above-mentioned TOC information or data control file in area other than the above-mentioned usual write-in area, storing in the 2nd memory of the above, and comparing the content of the above 1st and the 2nd memory
[Claim 2] A means to perform the above-mentioned verification in a disk unit according to claim 1 is a disk unit characterized by generating the warning which tells that writing is unstable when the contents of the above 1st and the 2nd memory are inharmonious.
[Claim 3] A means to perform the above-mentioned verification in a disk unit according to claim 1 is a disk unit characterized by writing in the above-mentioned TOC information or a data control file to the area prepared for record laser-power adjustment on the disk-like record medium.
[Claim 4] A means to perform the above-mentioned verification in a disk unit according to claim 1 is a disk unit characterized by lowering a laser power more and writing in the above-mentioned TOC information or a data control file.

[Translation done.]

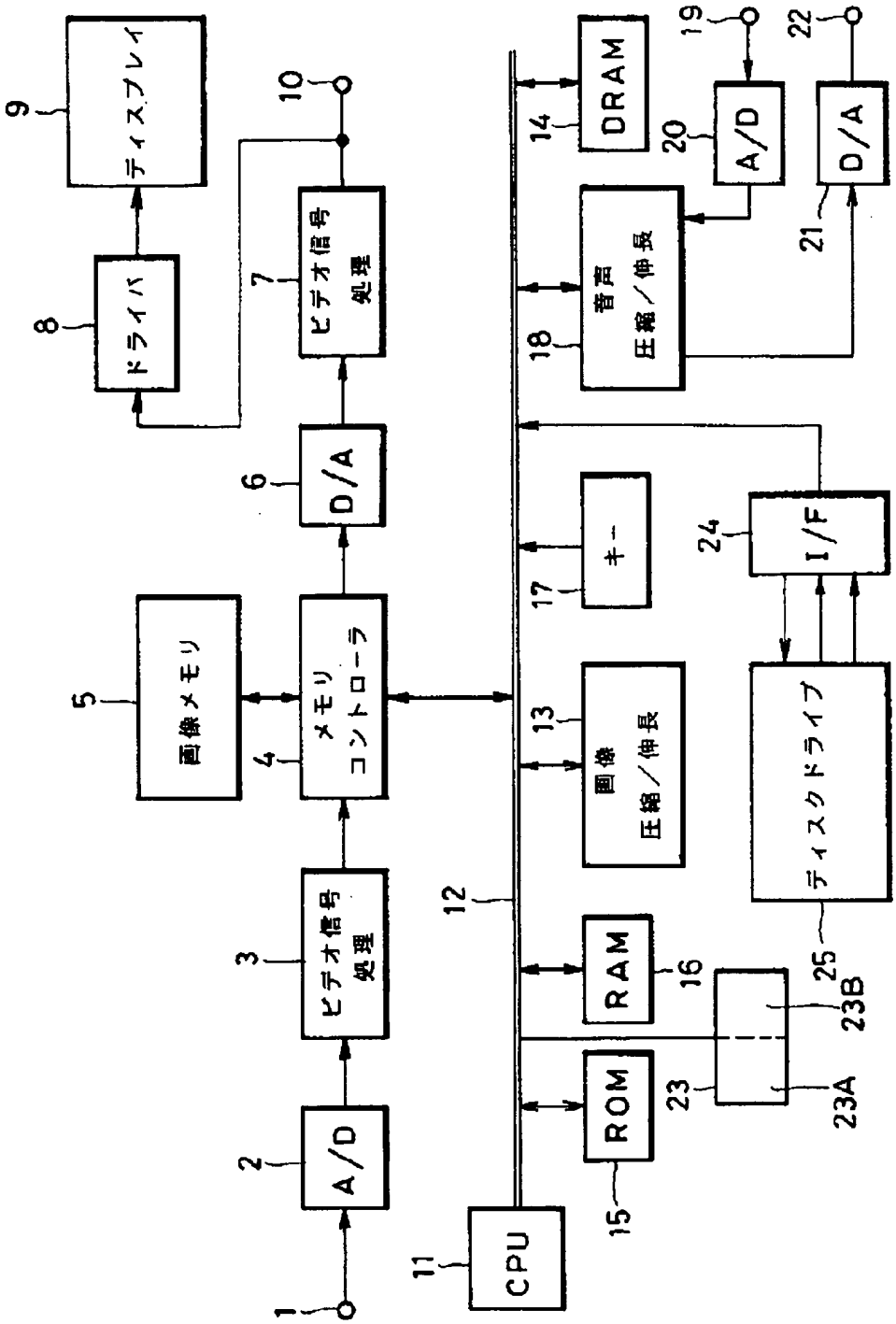
[Drawing 3]



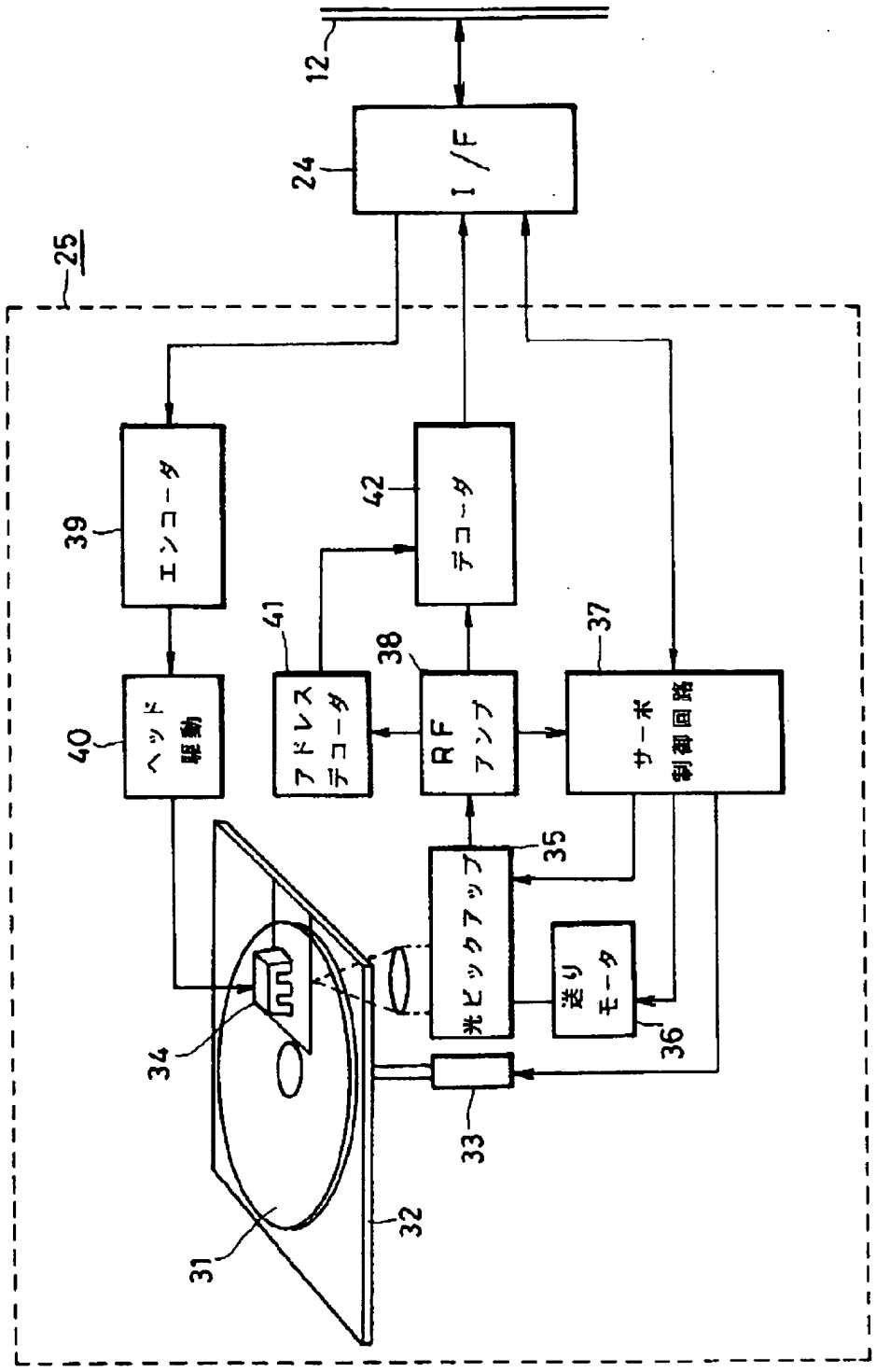
[Drawing 4]



[Drawing 1]


1
2
A/D
3
ビデオ信号処理
4
メモリコントローラ
5
画像メモリ
6
D/A
7
ビデオ信号処理
8
ドライバ
9
ディスプレイ
10
11
CPU
12
13
画像圧縮／伸長
14
DRAM
15
ROM
16
RAM
17
キー
18
音声圧縮／伸長
19
20
A/D
21
D/A
22
23
23A
23B
24
I/F
25
ディスクドライブ

[Drawing 2]


12
I/F
24
25
エンコーダ
39
デコーダ
42
41
38
37
ヘッド駆動
40
アドレスデコーダ
RF アンプ
サーボ制御回路
35
光ピックアップ
送りモータ
36
34
33
32
31

[Drawing 5]

	16bit MSB LSB	16bit MSB LSB	16bit MSB LSB	16bit MSB LSB	
	00000000	11111111	11111111	11111111	0
	11111111	11111111	11111111	11111111	1
	11111111	11111111	11111111	00000000	2
	ClusterH	ClusterL	00000000	00000010	3
	00000000	00000000	00000000	00000000	4
	00000000	00000000	00000000	00000000	5
	"M"	"I"	"N"	"I"	6
	Disk type	Rec power	First TNO	Last TNO	7
	リードアウトスタートアドレス(LOA)			Used Sectors	8
	キャリブレーションエリアスタートアドレス(PCA)			RECパワーPW2	9
	U-TOCスタートアドレス(USTA)			00000000	10
	レコーダブルユーザーエリアスタートアドレス(RSTA)			00000000	11
	00000000	P-TNO1	P-TNO2	P-TNO3	12
	P-TNO4	P-TNO5	P-TNO6	P-TNO7	13
	P-TNO248	P-TNO249	P-TNO250	P-TNO251	74
	P-TNO252	P-TNO253	P-TNO254	P-TNO255	75
	00000000	00000000	00000000	00000000	76
	00000000	00000000	00000000	00000000	77
01h	スタートアドレス(トラック#1)			トラックモード	78
	エンドアドレス			00000000	79
02h	スタートアドレス(トラック#2)			トラックモード	80
	エンドアドレス			00000000	81
	スタートアドレス(トラック#3)			トラックモード	82
	エンドアドレス			00000000	83
FCh	スタートアドレス			トラックモード	580
	エンドアドレス			00000000	581
FDh	スタートアドレス			トラックモード	582
	エンドアドレス			00000000	583
FEh	スタートアドレス			トラックモード	584
	エンドアドレス			00000000	585
FFh	スタートアドレス(トラック#255)			トラックモード	586
	エンドアドレス			00000000	587

P-TOCセクタ0

[Drawing 6]

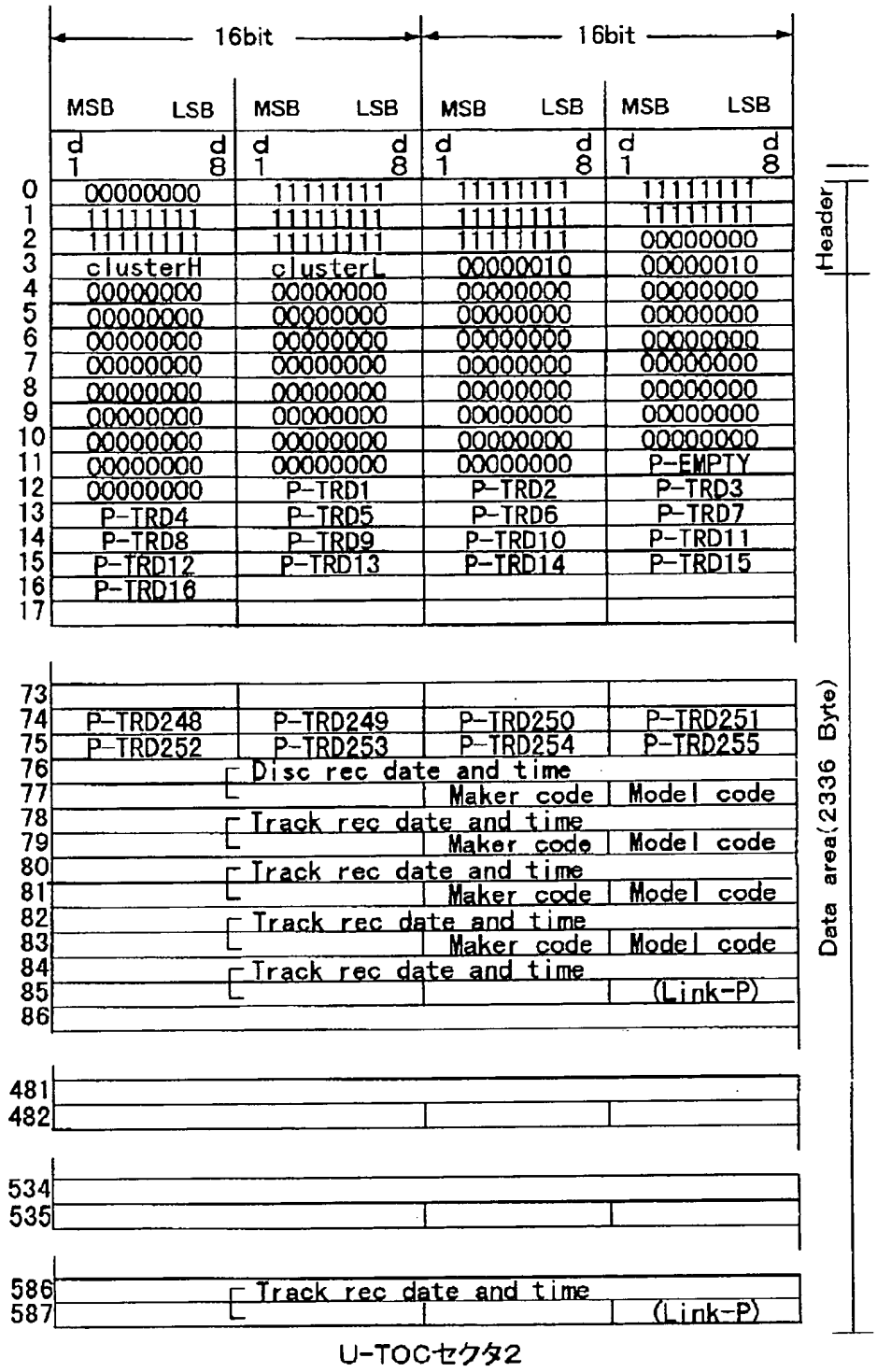
	16bit MSB LSB	16bit MSB LSB	16bit MSB LSB	16bit MSB LSB	
	00000000	11111111	11111111	11111111	0
	11111111	11111111	11111111	11111111	1
	11111111	11111111	11111111	00000000	2
	ClusterH	ClusterL	00000000	00000010	3
	00000000	00000000	00000000	00000000	4
	00000000	00000000	00000000	00000000	5
	00000000	00000000	00000000	00000000	6
	Maker code	Model code	First TNO	Last TNO	7
	00000000	00000000	00000000	Used Sectors	8
	00000000	00000000	00000000	00000000	9
	00000000	00000000	00000000	Disc Serial No.	10
	Disc	ID	P-DFA	P-EMPTY	11
	P-FRA	P-TNO1	P-TNO2	P-TNO3	12
	P-TNO4	P-TNO5	P-TNO6	P-TNO7	13
	P-TNO248	P-TNO249	P-TNO250	P-TNO251	74
	P-TNO252	P-TNO253	P-TNO254	P-TNO255	75
	00000000	00000000	00000000	00000000	76
	00000000	00000000	00000000	00000000	77
01h	スタートアドレス			トラックモード	78
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	79
02h	スタートアドレス			トラックモード	80
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	81
03h	スタートアドレス			トラックモード	82
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	83
FCh	スタートアドレス			トラックモード	580
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	581
FDh	スタートアドレス			トラックモード	582
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	583
FEh	スタートアドレス			トラックモード	584
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	585
FFh	スタートアドレス			トラックモード	586
	ｴﾝﾄﾞｱﾄﾞﾚｽ			リンク情報	587

[Drawing 7]

	16bit MSB	LSB	MSB	LSB	16bit MSB	LSB	MSB	LSB	
	00000000		11111111		11111111		11111111		0
	11111111		11111111		11111111		11111111		1
	11111111		11111111		11111111		00000000		2
	ClusterH		ClusterL		00000001		00000010		3
	00000000		00000000		00000000		00000000		4
	00000000		00000000		00000000		00000000		5
	00000000		00000000		00000000		00000000		6
	00000000		00000000		00000000		00000000		7
	00000000		00000000		00000000		00000000		8
	00000000		00000000		00000000		00000000		9
	00000000		00000000		00000000		00000000		10
	00000000		00000000		00000000		P-EMPTY		11
	00000000		P-TNA1		P-TNA2		P-TNA3		12
	P-TNA4		P-TNA5		P-TNA6		P-TNA7		13
	P-TNA248		P-TNA249		P-TNA250		P-TNA251		74
	P-TNA252		P-TNA253		P-TNA254		P-TNA255		75
	ディスクネーム								76
	ディスクネーム						リンク情報		77
01h	ディスクネーム／トラックネーム								78
	ディスクネーム／トラックネーム						リンク情報		79
02h	ディスクネーム／トラックネーム								80
	ディスクネーム／トラックネーム						リンク情報		81
03h	ディスクネーム／トラックネーム								82
	ディスクネーム／トラックネーム						リンク情報		83
FEh	ディスクネーム／トラックネーム								584
	ディスクネーム／トラックネーム						リンク情報		585
FFh	ディスクネーム／トラックネーム								586
	ディスクネーム／トラックネーム						リンク情報		587

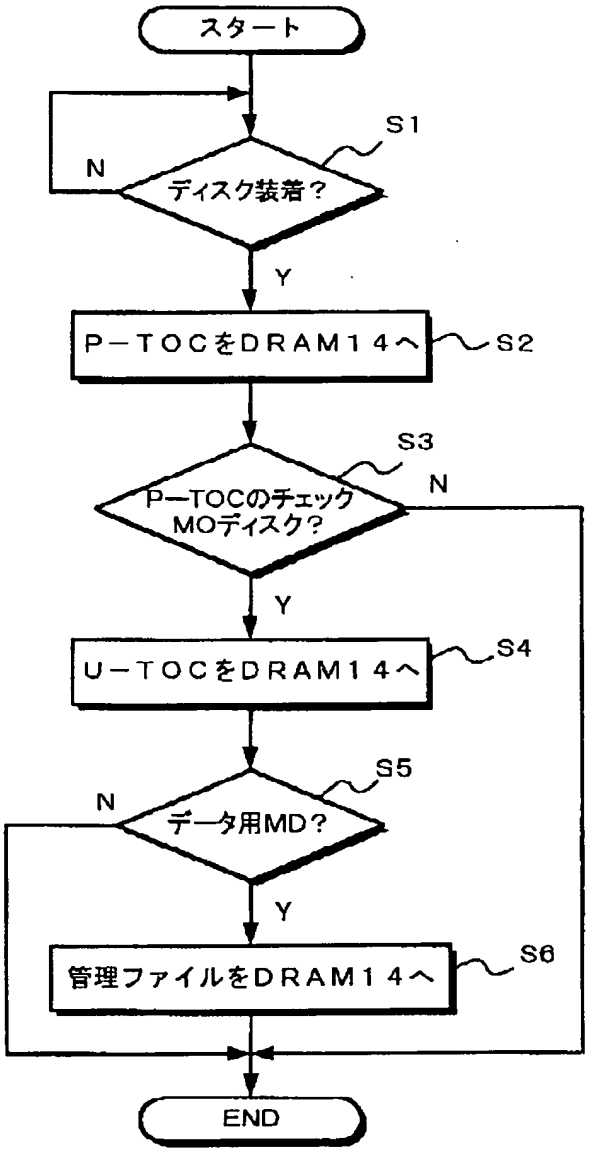
U-TOCセクタ1

[Drawing 8]



U-TOCセクタ2

[Drawing 9]


スタート
S1
N
ディスク装着？
Y
P－TOCをDRAM14へ
S2
S3
P－TOCのチェック
MOディスク？
N
Y
U－TOCをDRAM14へ
S4
S5
N
データ用MD？
Y
管理ファイルをDRAM14へ
S6
END

[Drawing 10]